





TK-IMT602 Fuel Injector Cleaner & Tester User Manual

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1 Introduction

Thinkcar TK-IMT602 Injector Cleaner & Tester is an electronic mechanical product which combining ultrasonic clean technology and microcomputer control simulation automobile fuel injection technology. The product uses efficient ultrasonic and the solubility of the cleaning liquid to clean the surface of injectors to recover its original characteristics. At the same time, the product simulates various working conditions of the engine, and tests injectors of various cars. The products is necessary for the automobile maintenance, repair shops, research and teaching and training departments.

2 Function & Specifications

2.1 Main functions

- **Ultrasonic Cleaning**: To perform simultaneous cleaning on one or several injectors and to remove the carbon deposits on the injector completely.
- Reverse Flushing: to remove the dirt inside the injector and attached to the filter.
- **No disassembly cleaning**: The unit is equipped with various adaptors and couplers that facilitate cleaning on the injectors on vehicle (additional tools and special liquids).
- Atomization observation: to carefully observe the spray atomization of the fuel injectors under background lamp.
- Sealing test: test the sealing and leakage of injectors under high pressure.
- · Uniformity test: detect the uniformity of each injector.
- · Automatic cleaning detection: real simulation of injectors test under various conditions.
- Injection Detection: the injection fuel amount of injectors under specific operating parameters (for example in the same time or the same times) can be detected.

2.2 Main Features

- · Ultrasonic powerful cleaning technology has strong cleaning ability.
- Electronic pressure regulating control technology, stable oil pressure, wide adjustable range.
- BOSCH oil pump can ensure long-term and stable use.
- High-definition digital tube display makes the operation clear and easy to learn.
- Fuel tank level is visually displayed, and the test liquid can be recycled.
- Bright background light for a clear view of the injector operation.
- Applicability wide, It can work for different types of injector with compound adapters.
- Allow arbitrary adjustment the test time, operating frequency, oil injection times, minimum switching cycle of the injectors within the allowable range.

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2.3 Working environment & Technical parameters

ower supply	AC 220 V/ 110 V ± 10%	
requency	50 Hz / 60 Hz ± 0.5	
elative humidity	< 90 %	
mbient temperature	0°C ~ + 50°C	
otice	No open fire is allowed around	
xternal magnetic field strength	< 400 A/m	
il tank volume	1500 ml	
leasuring cylinder volume	125 ml	
peed	0 ~ 7500 r/ min	
njection times	0~7500, steps 100 ms	
WM width	0~20.0 ms, step 0.1 ms	
ystem pressure	0~72 psi (adjustable)	
imiming	0~20 min (adjustable)	
nput power	250 W	
Itrasonic cleaning power	70 W (intermittent operation)	
Itrasonic cleaning frequency	28 KHz ± 0.5 KHz	
imensions (L x W x H)	380 mm × 485 mm × 470 mm	
let weight	16 Kg	

3 Structural composition



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3.2 Control Panel



FUNCTIONS/PULSE WIDTH

Four - bit red tube displays selected functions. Select the function **[**FUNCITONS MENU**]** in order by **[+]** and **[-]**. **[**01**]** means the top one, **[**13**]** means the last one. When the machine is in startup, press **[+]** and **[-]** can change the pulse width ratio, affecting the amount of oil injected.

WORKING/INJECTING TIMES

Four - bit red tube displays time, each function runs with the default time. When it needs to be increased, it can change the working time by pressing (+) and (-) before clicking (START).

PRESSURE REGULATING

The pressure gauge is used to display the working pressure ($0 \sim 72psi$). The pressure of the test fluid is increased or decreased by [+] and [-] icons to simulate the pressure of automobile fuel injection.

FUNCITONS MENU

The function list is detailed and needs to be selected by the [+] and [-] buttons of [FUNCTIONS / PULSE WIDTH] .

START

Press to execute the functions selected in **[FUNCTIONS/PULSE WIDTH]**.

PAUSE

Stop the selected function temporarily and press **[START]** again to continue.

STOP

Stop the selected function immediately and return the selected function item.

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3.3 Tool drawer description



- (1) Adaptors for reverse cleaning
- (2) 10-13.6 mm conical adaptor for spray testing
- (3) 11mm Japanese Automotive Fittings for Jet Testing
- (4) Round plug, need to be used when not testing all 6 cylinders
- (5) Special oil nozzle gasket, some oil nozzles are small, used for fixing
- (6) The oil rail, the joint is screwed on this groove, the nozzle is connected to the head, and it is pressed tightly.
- (7) Adapter cable, used to solve some special nozzle electronic interface
- (8) The cleaning fluid drain valve is installed on the back of the machine after disassembly. In order to prevent liquid leakage, it must be covered with sealant
- (9) The fuel injector locks the screw nut for pressing the fuel rail and the nozzle.

4 Operating Procedures

4.1 Ultrasonic Cleaning

Ultrasonic cleaning is the penetration and cavitation shock wave generated by the ultrasonic wave propagating in the medium. The object with complex shape, inner cavity and fine pores is strongly cleaned to completely remove the stubborn carbon on the injector.

4.1.1 Preparation

 Remove the injector from the vehicle and carefully check the rubber seal of the injector for damage. If it is damaged, replace the same type of seal before the cleaning test, in order to avoid leakage during the test. Put the nozzle into gasoline or detergent, carefully remove the external oil and wipe it with a soft cloth.

- Turn on the power. Plug the end of the power cord into the socket of the equipment and the other end into the AC 220 V power outlet. Turn on the power switch at the side of the main unit.
- 3) Take out the cleaning bracket from the accessory box, put it into the ultrasonic tank, and place the outside cleaned injector on the positioning hole of the cleaning bracket in the ultrasonic tank.

4.1.2 Method and Steps

[01] Ultrasonic Cleaning

- 1) Add an right amount of cleaning liquid to the ultrasonic tank. Generally, the cleaning liquid can be immersed over the cleaning bracket.
- 2) Insert the injector pulse signal line into the injector separately. (Special injectors need to be connected with an adapter cable)
- 3) Press the [+] and [-] keys of [FUNCTIONS/PULSE WIDTH] to select [01], corresponding to the [Ultrasonic Cleaning] option, then press the [+] and [-] keys of [WORKING/INJECTING TIMES] to set the time. (The system defaults to 10 minutes. Please use the up and down keys for modification if needed)
- 4) Press [START] . (Press [PAUSE] to suspend or press [STOP] to exit during working)
- 5) The working time is counting down. When it is 0, the system automatically stops.
- 6) Take the nozzle from the ultrasonic tank and clean the cleaning liquid with a soft cloth to prepare for the next job.

Note:

- During the cleaning process, you can hear the intermittent (approximately 5 seconds) vibrating sound when you take the injector out and put it next to your ear, to judge whether the injector is working properly.
- In the case that the ultrasonic tank is not filled with cleaning liquid, don't perform ultrasonic cleaning, otherwise the ultrasonic equipment will be damaged.

4.2 Test Function

This function is to detect the atomization, dripping, blockage, fuel injection angle status of the injector, and the size and balance of the fuel injection volume of each injector at different speeds.

4.2.1 Preparation

1) Add test liquid, as shown below.



(Right amount is 1200 ML, and the liquid level should not be lower than 1000 ML normally)

2) Installation of injector

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Installation of up-inlet injector



Installation diagram of up-inlet injector

- a) Select the fuel injection assembly and oil separator plug from the accessory box, and install them into the oil separator.
- b) Install the injector in the forward direction (apply a small amount of grease on the "O" ring of the injector).
- c) Horizontally put the oil separator and the injector on the upper plate base, and tighten the two ends with the locking rod, to prepare for the test. (Special injectors must use extension rods, for example, micro-faces must also use extension pads or backing plates)

4.2.2 Method and Steps

[02] Idling Test (0-20 ms)

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- 1) Connect the quick connector of the black oil outlet pipe on the machine with the male end connector on the oil separator, and plug the fuel injector drive line.
- 2) Press the **[+]** and **[-]** buttons of **[**FUNCTIONS/PULSE WIDTH**]** to select **[**02**]** Idling Test.
- 3) Press up and down keys of working time to set the time. (Generally set to 2 minutes)
- 4) Press [START] to start working.
- 5) Press [+] and [-] keys of [PRESSURE PE GULATING] to adjust the pressure to 36-45 psi. (In the electronic injection system, the general oil pressure works at 36-45 psi)
- 6) Press the **[+]** and **[-]** key of the **[**FUNCTIONS/PULSE WIDTH**]** to select the corresponding pulse width.(Default system set is 3MS, normal adjustment is 3MS). Press the oil drain handle in order to observe the level of the oil.
- 7) The working time is counting down until 0, the system will automatically stop.
- 8) When the test completed, uplift the oil drain handle and put the test liquid back to the oil tank.

[03] Medium Speed

- 1) Press the **[+]** and **[-]** key of the **[**FUNCTIONS/PULSE WIDTH**]** to select **[**03**]** Medium Speed test mode.
- 2) Press 【START】 key.
- 3) The following operation procedures is same with the 02 item.
- [04] High speed Test (0-4 ms)
- 1) Press the **[+]** and **[-]** key of the **[**FUNCTIONS/PULSE WIDTH**]** to select **[**04**]** High Speed Test mode.
- 2) Press START key
- 3) The following operation procedures is same with the 02 item.

[05] Accelerating Test

- 1) Press the **[+]** and **[-]** key of the **[FUNCTIONS/PULSE WIDTH]** to select **[**05**]** Accelerating Test mode.
- 2) Press 【START】 key.

Note:

• The system will set the fuel pressure, working time and pulse width systems automatically, default time is 10s as one circulation period. User's setting is unnecessary.

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- The system will automatically simulate the working status and oil inject value of injector at 700-7500 rpm constant accelerate condition in three times.

[06] Shifting Speed Test

- 1) Press the **[+]** and **[-]** key of the **[**FUNCTIONS/PULSE WIDTH**]** to select **[**06**]** Shifting Speed Test mode.
- 2) Press 【START】 key.

Note:

- The system will set the fuel pressure, working time and pulse width systems automatically, default time is 10s as one circulation period. User's setting is unnecessary.
- The system will automatically simulate the working status and oil inject value of injector at Idle Speed (700rpm), Medium Speed(4,500rpm) and High Speed (7,500rpm) working condition in three times.

[07] Leak checking Test

- 1) Press the **[+]** and **[-]** key of the **[FUNCTIONS/PULSE WIDTH]** to select **[**07**]** Leakage checking Test mode.
- 2) Press the **[+]** and **[-]** key of the **[**WORKING TIMES**]** to set time. (General setting is one minute)
- 3) The following operation procedures is same with the 02 item.

Note:

- Default pulse width system is 3 ms.
- · Simulate the system pressure under 45 psi and test whether the injector has dripping.

[08] Idling Spray Value Test

- 1) Press the **[+]** and **[-]** key of the **[FUNCTIONS/PULSE WIDTH]** to select **[**08**]** Idling Spray Value Test mode.
- 2) Press the **[+]** and **[-]** key of the **[**WORKING/INJECTING TIMES**]** to set times. (General time is 2,000)
- 3) The following operation procedures is same with the 02 item.

Note:

Simulate the working status and inject value under the idle speed of engine in several times.

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[09] Medium Speed Spray Value Test

- 1) Press the [+] and [-] key of [FUNCTIONS/PULSE WIDTH] to select the 09 Medium Speed Spray Value Test mode.
- 2) The following operation procedures is same with the 08 item.

[10] High Speed Spray Value Test

- 1) Press the **[+]** and **[-]** key of **[FUNCTIONS/PULSE WIDTH]** to select the 10 High Speed Spray Value Test mode.
- 2) The following operation procedures is same with the 08 item.

Note:

- Flow equilibrium: Test the flow equilibrium under different rmp, when the test liquid level at 2/3 of the counting instrument, it will pause or stop work. The deviation of the inject value should not exceed 2% for all the nozzle of one vehicle. Please refer to the relative tech-manual of injector nozzle, in order to observe the flow equilibrium.
- **Injector shape observation:** Observe the injection shape, angle uniformity of all the injector nozzle of one vehicle. And adjust the injector nozzle open pulse width simultaneously, observe the uniformity of the minimum open pulse width.
- Leakage test: Detect the nozzle valve seal under system high pressure.(Observe the nozzle seal, it should not has the leakage in one minute normally.

4.3 Reverse Flushing

Reverse Flushing, The test liquid from the outlet to the inlet, it can wash the dirt out from the internal parts of the nozzle and filter mesh.

4.3.1 Preparations

- 1) Add test liquid, reference to 4.2.1.
- (Approximately fill about 1800 ml. The liquid level should not be lower than 1000 ml normally)
- 2) Reverse flushing installation of the top-injection nozzle.

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Schematic diagram of reverse flushing installation

- 1. Oil outlet pipe quick connector
- 2. Locking Lever
- 3. Oil Separator Joint
- 4. Oil rail
- 5. Upper Recoil Coupler
- 6. Recoil Seal Ring Φ24

- 7. Reverse installation of jacking oil injector
- 8. Extension Rod
 - 9. Lower Recoil Coupler
- 10. Upper Plate Base
- 11. Measuring Cylinder
- a. Select the upper recoil coupler (part 5) and the oil separator end cap to plug into the oil separator (part 4) from the accessory box.
- b. Put the recoil seal ring (part 6) on the fuel injection nozzle, (as shown in the figure), and then install the fuel injection nozzle in the opposite direction. (The oil outlet is facing upwards and the oil inlet is facing downwards)
- c. Select the lower recoil coupler (part 9) from the accessory box and place it on the oil inlet of the upper plate base (part 10).
- d. Place the oil separator 4 and the horizontal end of the fuel injector on the lower recoil coupler (part 9), and tighten the two ends with the extension rod 8 and the locking rod 2. Ready to test.

4.3.2 Methods and steps

[11] Reverse Flushing

- 1) Connect the quick connector of the black oil outlet pipe on the machine with the male end connector on the oil separator, and insert the fuel injector drive line.
- 2) Press the [+] and [-] key of [FUNCTIONS/PULSE WIDTH] to select item 11 "Reverse Flushing".

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- 3) The system default time is 1 minute. Press [START] to start working.
- 4) Adjust the pressure to 36 45 psi.
- 5) The remaining working time reduces gradually. When it goes to 0, the system automatically stops.
- 6) After the test, raise the drain handle and put the test agent back into the fuel tank.

Note:

- · Reverse flushing is applicable to top-injection nozzles only.
- In reverse flushing, the pulse width parameter of the fuel injector has been automatically set in the program, and users do not need to set it separately.
- Test liquid must be clean in the tank, to avoid clogging injector nozzle.

4.4 No disassembly cleaning

After the engine fuel supply system has been used for a period of time, the dust in the air and the impurities in the gasoline will make the fuel path unsmooth or blocked. In addition, the carbon deposits and gums produced during the combustion process will adhere to injector nozzle, fuel inlet, exhaust valve, throttle valve and combustion chamber. Therefore, it is necessary to clean the engine fuel supply system, combustion chamber and fuel injection nozzles in time.

4.4.1 Preparations

- 1) Open the oil drain screw at the bottom of the main engine to release all the test liquid in the oil tank.
- 2) Open the hood of the car to find the fuel inlet and return pipes of the fuel supply system of the car.

4.4.2 Methods and Steps

[12] No disassembly cleaning (need to purchase additional accessories)

* This function requires Special cleaning fluid and tools, please use it with caution.

- 1) Connect the male end of the red non-dismantling pipe to the oil return pipe of the fuel supply system (choose a suitable connector from the accessory box), and the other end to the male end on the upper right side of the equipment.
- 2) Start the engine to extract 600ml-800ml gasoline from the car tank through the oil return pipe (watching through the right window of the machine), and then turn off the engine.
- 3) Connect the male end of the blue non-dismantling pipe to the oil inlet pipe of the fuel supply system, (choose the right connector from the accessory box), and the other end to the black high-pressure oil pipe of the equipment.
- 4) Unplug the car oil pump fuse or oil pump relay in the condition of not affecting the work of other systems, or find a suitable connector from the accessory box to connect the oil inlet

and return pipes of the original car to make it a loop. (Note: The fuel tank cap must be opened, otherwise it is dangerous.)

- 5) Turn on the power of the equipment, press the item selection key to select item 12 "No disassembly cleaning", and press the time adjustment key to adjust the time to 20 minutes-30 minutes.
- 6) Set the pressure according to the technical requirements of the car. (Generally, 0.25-0.3MPa is suitable to most car models).
- 7) Press 【START】 key. Wait a few seconds to start the engine.
- 8) After engine starts, pour the disassembly-free cleaning liquid from any round hole above the glass tube of the equipment. (The ratio of disassembly-free liquid and fuel is about 1:4. Normally 1/2 bottle for four-cylinder cars, 3/4 bottle for six-cylinder cars, and 1 bottle for eight-cylinder cars)
- 9) Adjust the car throttle. (1-10 minutes idling operation, 10-15 minutes medium and high-speed operation, the rest of the time idling operation)
- 10) The time gradually decreases, and when it is reduced to 0, the system automatically stops. Remove the non-dismantling device, and recovery the car's oil inlet and return pipes and insurance.
- 11) Start the engine and run the car at high speed for 2-3 minutes to discharge the washed carbon deposits in the exhaust pipe. At the same time, check whether there is leakage at the oil pipe interface of the vehicle's fuel supply system.

Note:

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- · The cleaning liquid is flammable, so pay attention to safety when cleaning.
- Before cleaning, it must be confirmed that all pipelines are connected well and there is no leakage.

[13] Device Information

Remark the the equipment serial number and date of manufacture

If the model or function is changed, operate according the operation panel description.

5 Maintenance

5.1 Organization

- 1) Turn off the power and unplug the power.
- 2) Put all the even parts and free-disassembly connectors back into the accessory box for storage.
- 3) Put the ultrasonic cleaning liquid back into the original bottle and seal it, and wipe the equipment clean with a dry soft cloth.
- 4) If it is not used for a long time, open the oil drain screw at the bottom of the main unit and put the test liquid in the oil tank back into the original bottle for sealed preservation.

5.2 Maintenance

1) Test liquid replacement

When the test liquid is used for a period of time, a lot of impurities will accumulate. The test agent containing dirt cannot be used, otherwise it will easily block the fuel injector. When replacing the test agent, first unscrew the oil drain nut to release the test agent. After draining it, inject a little clean test agent to clean the interior. After cleaning, re-tighten the oil drain nut and pour two bottles of new test agent.

2) Selection of cleaning agent and test agent

When choosing cleaning agent and test agent, choose one that does not contain any acid and alkali components, otherwise it will easily burn the oil pump, the core component of the equipment, or cause corrosion to the oil supply pipeline; pay attention to the test solvent used for spray calibration Its environmental protection, efficient dispersion, anti-precipitation, high temperature stability and oxidation resistance.

(!) Special attention: cleaning liquid and test liquid cannot be mixed.

6 General Notice

- 1. Since the test device is part of quartz glass, it is easy to break, so do not place other objects around the equipment to avoid bumps and breaks.
- 2. If there is no digital display after power-on, please check whether the power supply has power; if so, check whether the plug is connected firmly, or whether the fuse is blown. If it is uninterrupted, and the switch is still invalid after pressing the switch several times, please contact the local dealer and do not disassemble it by yourself, otherwise our company will not provide the warranty.
- 3. When no cleaning liquid is added to the ultrasonic tank, it is strictly forbidden to open the ultrasonic cleaning item to avoid damage to the ultrasonic system due to empty driving.
- 4. Every time the test liquid is changed, it must be cleaned, and then about 1200 ml of test agent is added.
- 5. Use of unqualified test agent will cause corrosion of the oil pump, oil supply pipeline and malfunction of the pressure gauge.
- 6. It is strictly forbidden to use kerosene, gasoline, sina water and other testing agents and cleaning agents as testing agents and cleaning agents for this machine. Otherwise, the "O" ring and pipeline rubber parts in the equipment will be damaged, causing leakage.

7 Warranty Service

Thank you for choosing our products, we will provide you with the following services and promises:

- 1. This product is guaranteed for three years and maintained for life.
- $\ensuremath{\text{2.}}$ After the warranty period expires, only the cost of replacement parts and other direct

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expenses will be charged for repairs.

- 3. For machine upgrades, only cost is charged.
- 4. After the failure, please contact your local dealer, we will give you the most complete service in the shortest time.
- 5. The following items are not covered by the warranty:
 - a) Wearing parts are not covered by the warranty, including: glass test tube, drive line, control panel, sealing ring, pressure gauge.
 - b) Consumables are not covered by the warranty, including: testing liquid, cleaning liquid, and disassembly-free liquid.
 - c) When there is not cleaning liquid is added to the ultrasonic tank, the ultrasonic system is damaged by turning on the ultrasonic cleaning air blower, which is not covered by the warranty.
 - d) If the test liquid is not replaced in time after long-term using, the filter screen of the oil pump is blocked and the oil pump is burned out of the warranty.
 - e) If the cleaning liquid is used as a injector test liquid.
 - f) Man-made faults are not covered by the warranty.

8 Warranty Terms

This warranty applies only to users and distributors who purchase THINKCAR TECH INC www.thinkcar.com THINKCAR TK-IMT602 products through normal procedures. Provide free warranty within three years. THINKCAR TECH warrants its electronic products for damages caused by defects in materials or workmanship. Damages to the equipment or components caused by abusing, unauthorized modification, using for non-designed purposes, operation in a manner not specified in the instructions, etc.are not covered by this warranty. The compensation for dashboard damage caused by the defect of this equipment is limited to repair or replacement. THINKCAR TECH does not bear any indirect and incidental losses. THINKCAR TECH will judge the nature of the equipment damage according to its prescribed inspection methods. No agents, employees or business representatives of THINKCAR TECH are authorized to make any confirmation, notice or promise related to THINKCAR TECH products.

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Customer Service Email: support@thinkcarus.com

Official Website: www.thinkcar.com

Products tutorial, videos, FAQ and coverage list are available on Thinkcar official website. Follow us on

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9 Packing list of TK-IMT602 Injector Cleaner & Tester

Item	Name	Quantity (Pcs)
1	Host machine	1
2	13.6 mm diameter conical adaptor	6
3	11 mm diameter connector	6
4	Special nozzle pads	1
5	Oil board plug	5
6	Ultrasonic tank cover	1
7	16 mm diameter reverse cleaning adapter	6
8	Nozzle gasket	6
9	Fuel rails	1
10	Adapter cable	6
11	Power cable	1
12	Fuel rail fixing screw	2
13	Fuel rail fixing nut	2
14	Ultrasonic cleaning stand	1
15	Refueling funnel	1
16	Cleaning fluid drain valve	1
17	User manual	1